

Getting Started with Project-Based Learning in STEAM

Project-Based Learning (PBL) has many benefits for STEAM instruction. Language educators, however, often wonder how to create projects tailored to the content and language needs of ELLs.

In this webinar, we will:

- discover how PBL incorporates opportunities for meaningful language use across the four skills, as well as the acquisition of subject-specific language
- identify the characteristics of strong projects in STEAM courses
- explore a framework for developing clear objectives for PBL
- analyze sample projects for the ELT classroom



U.S. DEPARTMENT OF STATE



Catherine DiFelice Box and Anne Pomerantz



Catherine has over 20 years of experience in teacher education. Her research focuses on teacher-student communication in multilingual classrooms and on the teacher mentoring process for those who plan to work in linguistically diverse schools. Catherine holds an Ed.D. and an Ed.M. in Applied Linguistics from Columbia University. She is currently a Lecturer in Educational Practice at the University of Pennsylvania, Graduate School of Education.



Anne is an applied linguist and language educator. For over 20 years, she has helped ESL specialists, world language instructors, K-12 teachers, and university faculty to engage in teaching practices that support multilingual students. Her research focuses on how people communicate in multilingual classrooms and communities. Anne holds a Ph.D. in Educational Linguistics and an MS.Ed. in TESOL from the University of Pennsylvania, where she is currently a Professor of Practice.



U.S. DEPARTMENT OF STATE



Getting Started With Project- Based Learning in STEAM



This Photo by Unknown Author is licensed under CC BY-SA-NC



© 2021 by Catherine DiFelice Box and Anne Pomerantz. *Getting Started with Project-Based Learning in STEAM* for the American English Live Teacher Professional Development Series, sponsored by the U.S. Department of State with funding provided by the U.S. government and administered by FHI 360. This work is licensed under the Creative Commons Attribution 4.0 License, except where noted. To view a copy of the license, visit: <http://creativecommons.org/licenses/by/4.0/>



In this webinar, we will:

- Identify characteristics of strong projects for STEAM courses.
- Write at least one objective for a sample STEAM project.
- Select 1-3 appropriate language supports for a sample STEAM project.

Together, we will:



Define project-based learning (PBL) and discuss its key characteristics



Review two different STEAM projects

Prompt

Objectives

Language supports



Review tips for using STEAM projects in English classes

Getting to Know You!

... What's your STEAM team? Do you teach...



Defining project-based learning (PBL) in STEAM



In traditional approaches to teaching,

teachers transmit knowledge to students.





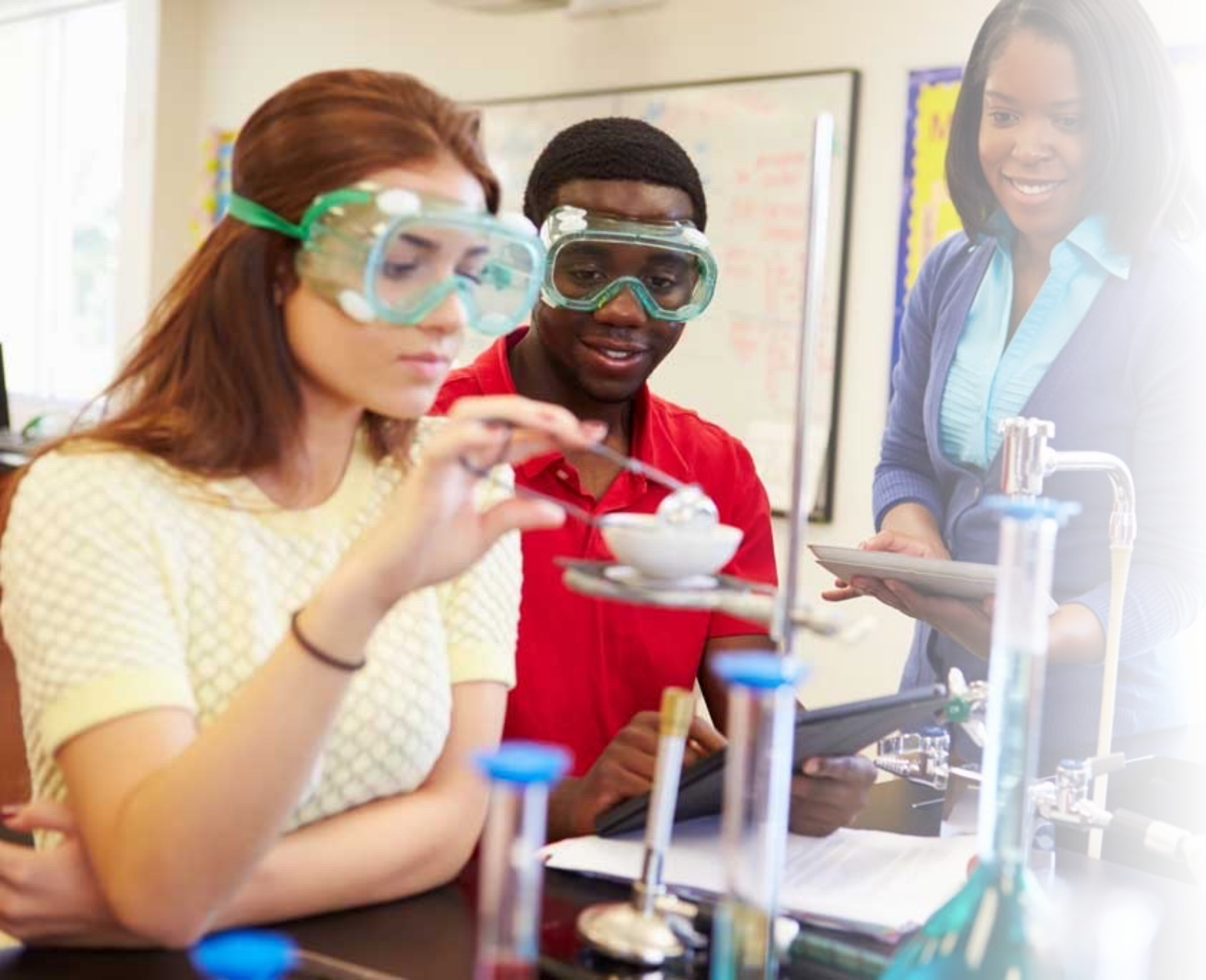
Banking metaphor

Teachers deposit
knowledge into
students' heads

In project-based learning,



teachers create projects that require students to work together to develop solutions to real-world questions and problems.



Project-based learning is:

- a form of *learning by doing*
- a more “hands on” way of engaging students with STEAM content



**Instead of learning
ABOUT science,**

students design
experiments and test
hypotheses just like real
scientists.

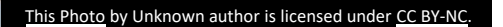
This Photo by Unknown Author is licensed under CC BY-SA



But what if I'm a language teacher... is PBL right for my students?

What are some characteristics of strong STEAM projects in English language classes?





Students doing PBL are...



- Working together
- Interacting
- Using the 4 skills
(reading, writing, speaking, & listening)
- Engaging in completing something specific



**Do all projects in
STEAM have so
much language
learning potential?**



What makes a strong STEAM project?

- Multiple opportunities to use subject-specific language
- Integration of the four skills (reading, writing, listening, speaking)
- Inclusion of opportunities for authentic language use & negotiation of meaning
- Clear & purposeful STEAM objective

Let's take a look at two projects

Topic: Let's plan a party

Which project is a
STEAM project?

Why? Give your reason.





Which project is a STEAM project?

Project 1

It's your friend's birthday! With your group, plan a surprise birthday party. What will the menu be? What activities will you do? Be ready to present your party plan to the class. The best party plan will win a prize!

Project 2

It's your friend's birthday! With your group, plan a surprise birthday party. Your shopping list is ready to go.

Oh no! You are low on funds. You will need to look at unit prices to get the best deal on each item. Be ready to share your plan with the class!



Let's take a closer look: Project 1

What would
you like for
dessert?

Let's buy a
chocolate cake!

I want
Karaoke!

We should
hire a band.



This Photo by Unknown author is licensed under [CC BY](#).



This Photo by Unknown author is licensed
under [CC BY-ND](#).

Project 1

- Use of vocabulary related to party planning (e.g., dessert, chocolate cake)
- Authentic or “real life” use of listening & speaking skills
- Modal verbs (e.g. would, should) to express wants & desires in polite ways (e.g., we should hire a band)





Does Project 1 meet our criteria?

Does it...



Include multiple opportunities to use subject-specific language



Integrate the four skills (reading, writing, listening, speaking)



Include opportunities for authentic language use & negotiation of meaning



Have a clear & purposeful STEAM objective.

Project 2: What do you see?



Put your observations in the chat

How much does the chicken cost per kilo?

It's \$2.38. I circled the unit price. Do we have enough money for 10 kilos?

It would be \$23.80 total.
Is the fish cheaper?

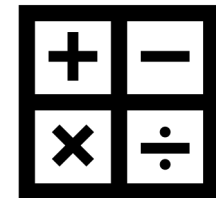
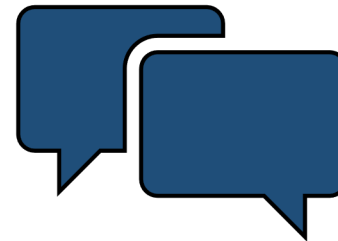
Fish is \$6.00 per kilo, but we need 3.5 kilos. Chicken is less expensive.

Shopping list
milk
1 dozen eggs
fish to cook
cheddar cheese
some kind of soup?



Project 2

- Use of vocabulary related to party planning
 - Authentic or “real life” use of listening & speaking skills
 - Subject-verb inversion to ask questions
 - Modal verbs to discuss possibilities
 - Comparative adjectives
- Use of mathematical reasoning to work out best unit price for each item on their party planning list





Does Project 2 meet our criteria?

Yes/ No? Why?

☐

Include multiple opportunities to use subject-specific language

☐

Integrate the four skills (reading, writing, listening, speaking)

☐

Include opportunities for authentic language use & negotiation of meaning

☐

Have a clear & purposeful STEAM objective.



Does Project 2 meet our criteria?



Include multiple opportunities to use subject-specific language



Integrate the four skills (reading, writing, listening, speaking)

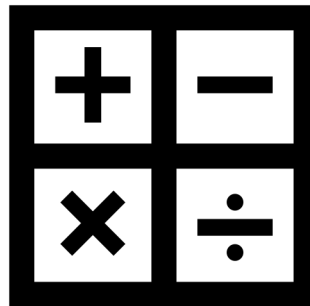
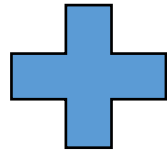
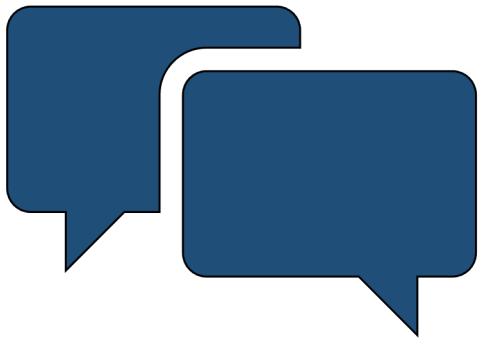


Include opportunities for authentic language use & negotiation of meaning



Have a clear & purposeful STEAM objective.

Success!



STEAM Project for
language learning



I see the benefits of PBL, but will my supervisor?

**How do I write
clear language
objectives?**



Consider using this formula...

Students will be able to (SWBAT)...

Action + Language forms



Let's return to Project 2

It's your friend's birthday!
With your group, plan a surprise birthday
party. Your shopping list is ready to go.

Oh no! You are low on funds.
You will need to look at unit prices to
get the best deal on each item. Be ready
to share your plan with the class!



Students will be
able to (SWBAT)...

determine the
most cost-
effective shopping
list.

What language skill
is “determine”?

What language
forms will
students use?





Your turn!

Project 2

It's your friend's birthday!
With your group, plan a surprise birthday party. Your shopping list is ready to go.

Oh no! You are low on funds.
You will need to look at unit prices to get the best deal on each item. Be ready to share your plan with the class!

Students will be able to (SWBAT)...

Action + Language forms

Project Objectives: Example 1

Action

SWBAT read product labels and circle the unit prices of products using subject-specific vocabulary.

Language forms

id - Beef 2.5kg \$9.94 \$3.98 per kg	Unit Price	Apple Juice 1.2 \$2.45 \$1.96 per litre
RED MATOES 410g	UNIT PRICE \$4.36 Per Kg	RETAIL PRICE \$1.79

This Photo by Unknown Author is licensed under CC BY-NC-ND

Project Objectives: Example 2

Action

SWBAT orally **compare** the unit prices of products using **comparative or superlative** adjectives.

Language forms

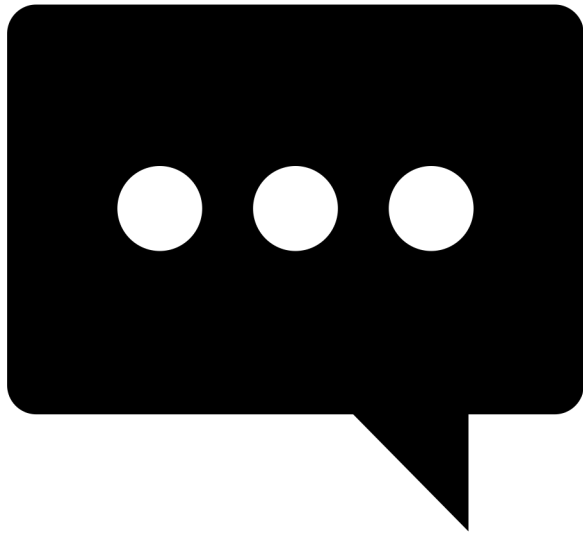
id - Beef 2.5kg \$9.94 \$3.98 per kg	Unit Price	Apple Juice 1.2 \$2.45 \$1.96 per litre
RED MATOES 410g	UNIT PRICE \$4.36 Per Kg	RETAIL PRICE \$1.79

This Photo by Unknown Author is licensed under CC BY-NC-ND

But wait...

What if students need
some help to work
independently in English?





What strategies do you use to get students to work independently in English?

Language Support Strategies

Category #1:

Modelling

Show students what to do by acting out the interaction



Modelling



Language Support Strategies for PBL



Category #1: Modelling

Language Support Strategies

Category #2: Input Enhancement

- ✓ Highlight key vocabulary in materials.
- ✓ Use **abundancy and redundancy strategies**.
 - + Repeat the word often in your teacher talk.
 - + Engage multimodal strategies (gestures, visuals, write/post/send in chat).
- ✓ Practice vocabulary through structured language activities.
- ✓ Provide a mini-lesson to address pertinent grammar points.

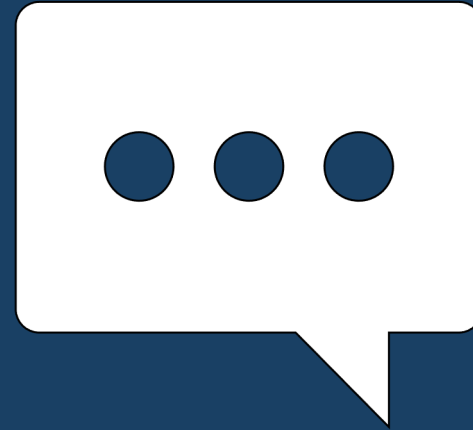
Input enhancement



lb = pound

Students, remember that chicken is sold by the **pound**. This is the **unit**. The **price per pound** is the unit price.

How do you
practice
vocabulary?



Language Support Strategies for PBL

Category #1: Modelling

Category #2: Input Enhancement



How can I do
project-based
learning in a large
class?

Use grouping strategically

Homogeneous groups:

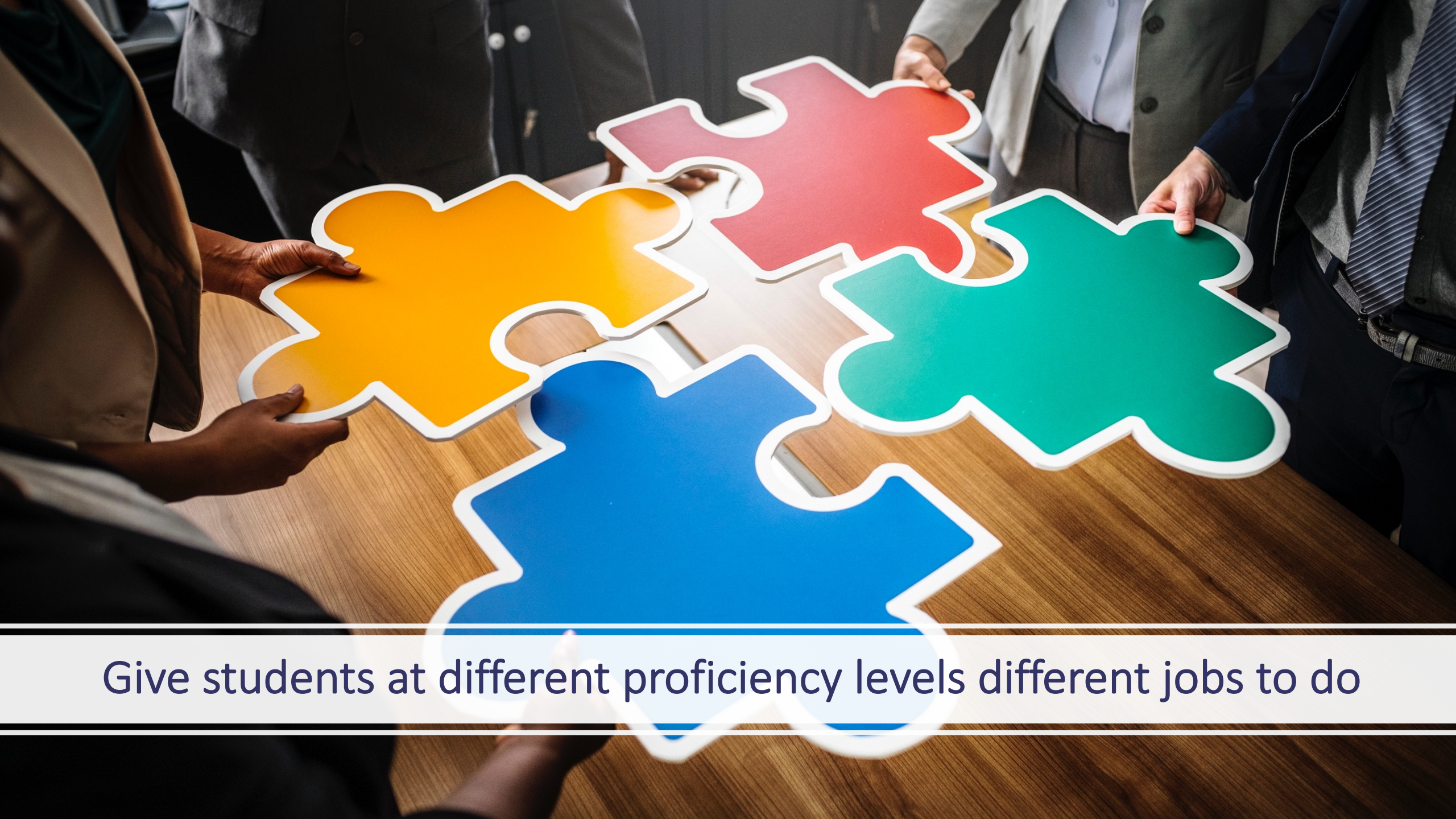
Students at same level of language proficiency work together

Heterogeneous groups:

Students at different levels of language proficiency work together

Provide different
materials for
different levels of
students





Give students at different proficiency levels different jobs to do

Language Support Strategies

Category #3: Project Differentiation

- ✓ Group flexibly.
- ✓ Provide different materials for different levels of students.
- ✓ Customize expectations for project completion according to student levels.



**What language
support strategies
would you use for
Project 2?**

Category #1: Modelling

Category #2: Input Enhancement

Category #3: Project Differentiation

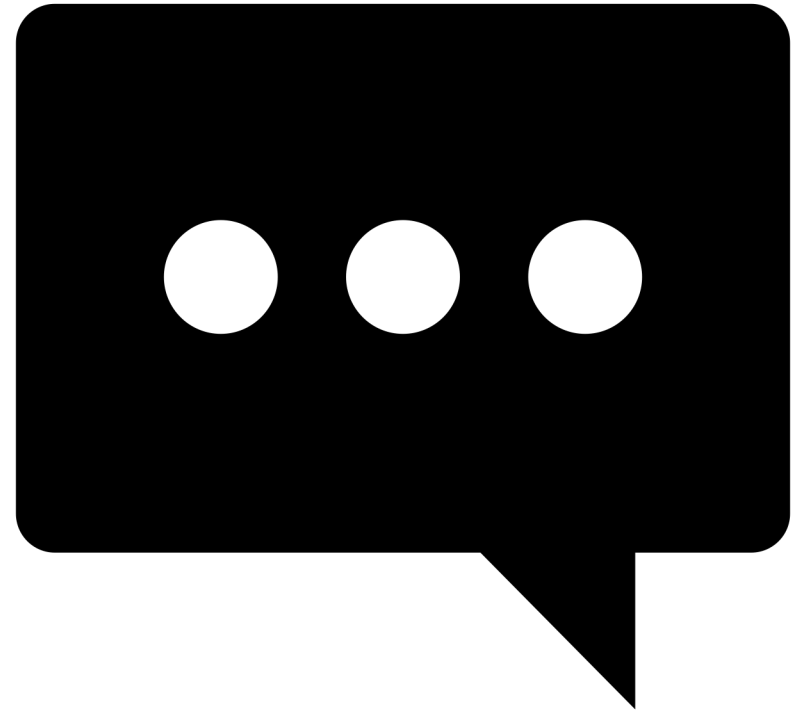
Can I do project-
based learning in an
online class?



What do you think?

Can language teachers do
project-based learning in an
online environment?

Yes or No? How?



Online options

Breakout rooms

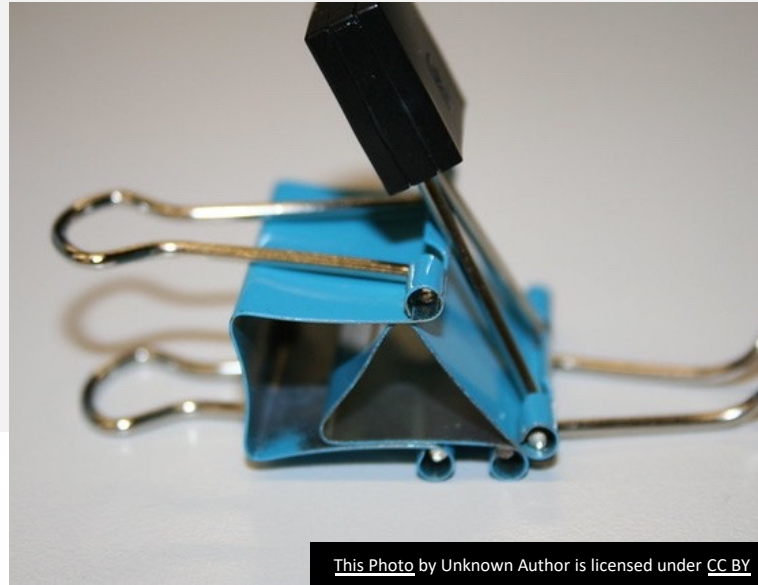
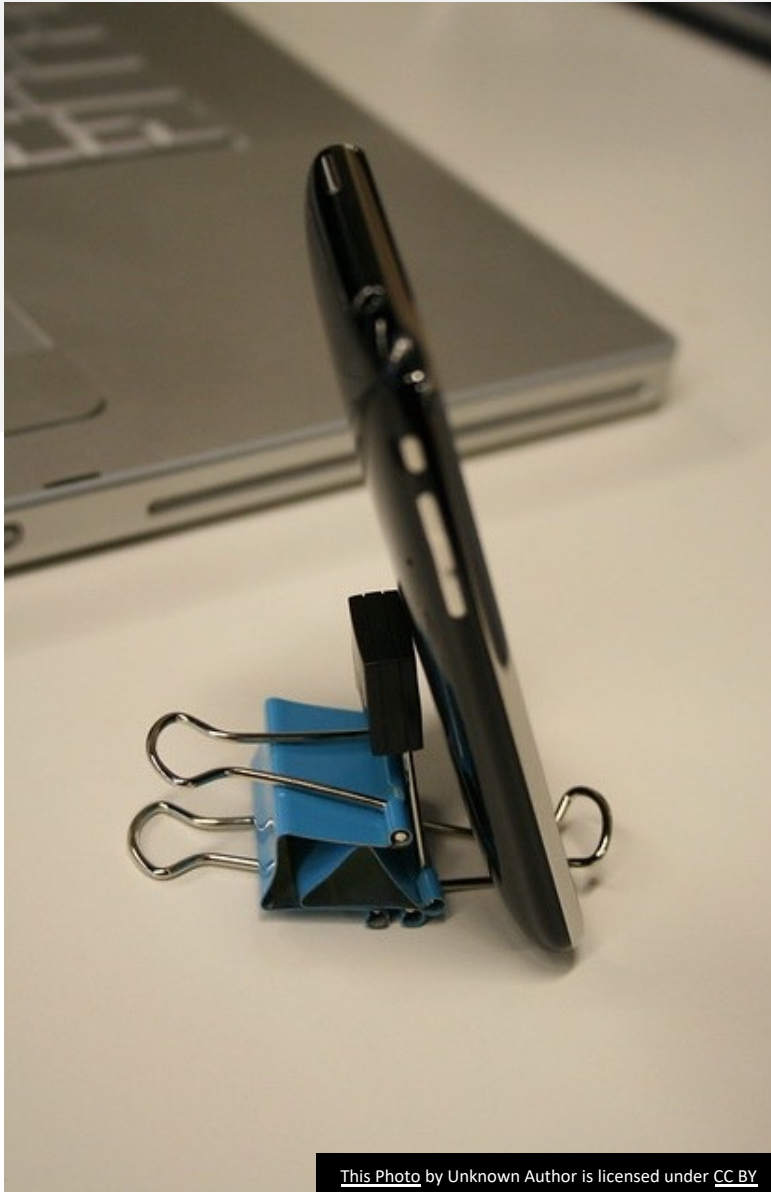
Chat

SMS/Text





New STEAM project for Engineering



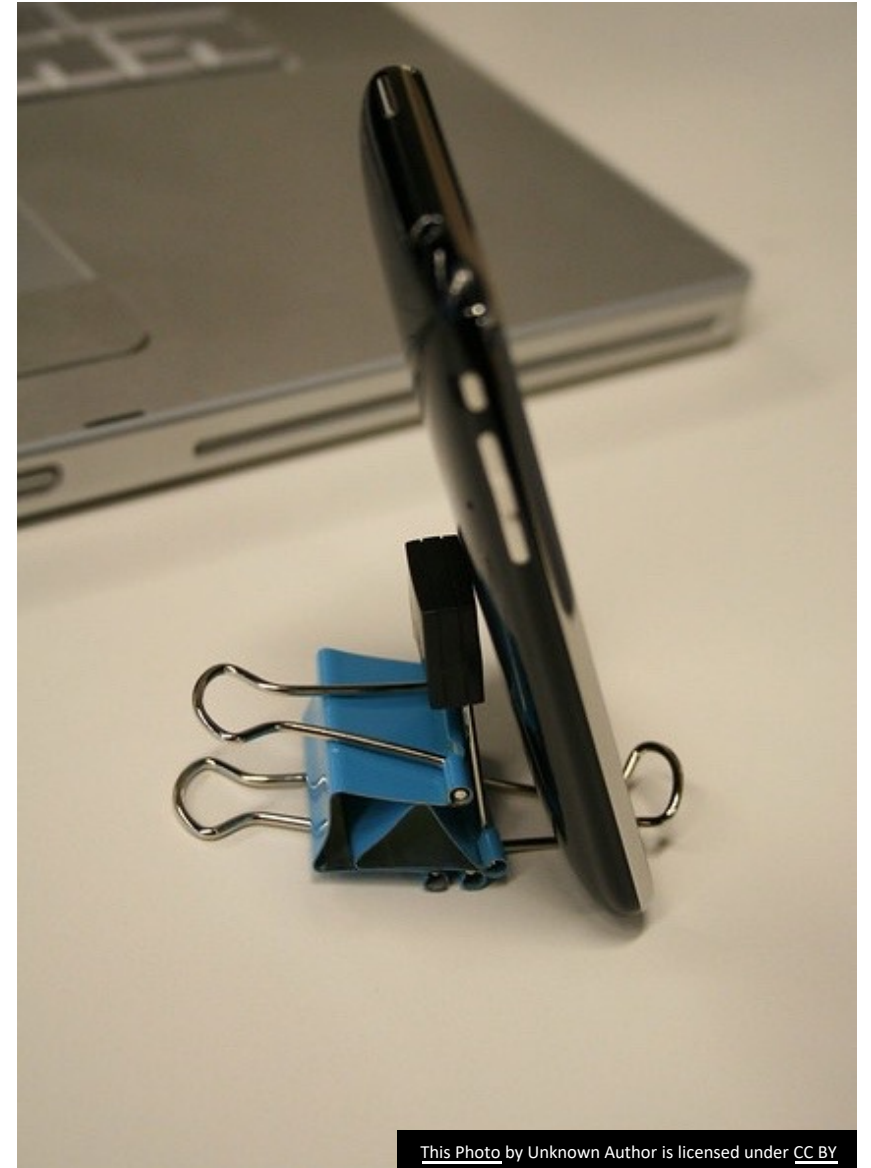
STEAM focus:

+ engineering design process
+ demonstrating
understanding of stability

How do we make a
smart phone stand out
of everyday objects?

Each group will...

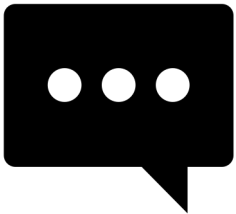
1. Research & share design ideas
2. Develop a procedure for building a prototype
3. Build a prototype



Language objectives

Develop a procedure for building a prototype

SWBAT orally **name** the materials needed to build a smart phone stand using **subject-specific vocabulary**.



SWBAT **write** the procedure for building the prototype using _____.

Sample language objective

SWBAT write the procedure for building the prototype using verbs in the simple present tense and sequence words.



**What language
support strategies
would you use for the
smart phone project?**

Category #1: Modelling

Category #2: Input Enhancement

Category #3: Project Differentiation



[This Photo](#) by Unknown Author is licensed under [CC BY](#)

STEAM + Project-based Learning = Success

Thank you!

Questions or concerns?

Email: americanenglishwebinars@fhi360.org

AE Live Webinar Resource Center

<https://openenglishcommunity.org/page/american-english-webinar-series/>

AE website: americanenglish.state.gov

AE YouTube channel: youtube.com/StateAmericanEnglish

AE for Educators Facebook page: facebook.com/AmericanEnglishforEducators

AE Facebook page: facebook.com/AmericanEnglishatState



Reflection Questions

1. Have you ever tried Project-based Learning (PBL)? What went well? What did you learn from your experience? What might you change after participating in this session?
2. Think about your curriculum. How might you include STEAM-related content in projects in your English language classes?
3. How might you prepare students to succeed with PBL? What support might you need to provide before and during a project?



U.S. DEPARTMENT OF STATE

